What is claimed is:

1. A transmission module for transmitting Time Division Multiplexed ("TDM") data over an Ethernet network comprising:

i) a TDM data converter/encapsulator for receiving TDM data from a source;

ii) a synchronous clock signal associated with said TDM data;

iii) a clock frequency multiplier coupled to said TDM data converter/ encapsulator;

iv) a switch for receiving converted/encapsulated TDM data and for receiving a master clock signal; and

v) wherein said master clock signal is generated by said clock frequency multiplier, said master clock signal being related to said synchronous clock signal associated with said TDM data;

wherein said switch is coupled to both

a) said TDM data converter/encapsulator, and

b) said clock frequency multiplier.

2. The transmission module of claim 1, wherein said switch comprises at least two ports, and wherein said master clock signal governs and synchronizes the timing of data transmissions from said switch.

3. The transmission module of claim 1, wherein said clock frequency multiplier has an input frequency, an output frequency, and a frequency multiplication ratio which is the ratio of said input and output frequencies, and wherein said clock frequency multiplier is adapted and arranged such that said output frequency is a multiple of said input frequency.

4. The transmission module of claim 3, wherein said output frequency equals said master clock frequency.

5. The transmission module of claim 1, wherein one or more of said input frequency, said output frequency, and said frequency multiplication ratio are digitally programmable.

6. A reception module for receiving converted/encapsulated Time Division Multiplexed ("TDM") data over an Ethernet network comprising:

i) a switch for receiving said converted/encapsulated TDM data from said Ethernet network over at least one Ethernet communications medium;

ii) a TDM decapsulator coupled to said switch;

iii) a clock recovery phase locked loop ("PLL") for receiving a frequency, said PLL being adapted to adjust a phase of said frequency to provide a phase-adjusted frequency; and

iv) a clock frequency divider coupled to said PLL for dividing said phase-adjusted frequency to recover a TDM clock signal associated with said TDM data.

7. The module of claim 6, wherein said TDM decapsulator is

a) coupled to said clock frequency divider, and

b) adapted and arranged to serialize said received converted/ encapsulated TDM data by means of said recovered TDM clock signal.

8. The module of claim 6, wherein said converted/encapsulated TDM data is received as Ethernet packets and said Ethernet packets are converted into at least one TDM protocol data stream.

9. The module of claim 6, wherein said switch comprises at least two ports.

10. The module of claim 6, further comprising

ix) a master clock signal which is adapted and arranged to govern and synchronize the timing of data received via said switch.

11. The module according to claim 6, wherein said clock recovery PLL extracts a high frequency clock signal from said received Ethernet data and said extracted frequency clock signal equals the data bit rate of said received TDM data.

12. The module according to claim 6, wherein said clock frequency divider has an input frequency, an output frequency, and a frequency division ratio which is the ratio of said input and output frequencies, and wherein said divider is adapted and arranged such that said output frequency is a fraction of said input frequency.

13. The module according to claim 12, wherein said output frequency equals said received TDM clock signal.

14. The module of claim 12, wherein one or more of said input frequency, said output frequency, and said frequency division ratio are digitally programmable.

15. A system for communicating Time Division Multiplexed data over an Ethernet network, said system comprising at least one transmission module and at least one reception module,

wherein said at least one transmission module comprises

i) a TDM data converter/encapsulator for receiving TDM data from a source;

ii) a synchronous clock signal associated with said TDM data;

iii) a clock frequency multiplier coupled to said TDM data converter/encapsulator; and

iv) a first switch for receiving converted/encapsulated TDM data and for receiving a master clock signal;

wherein said master clock signal is generated by said clock frequency multiplier, said master clock signal being related to said synchronous clock signal associated with said TDM data; and

wherein said first switch is coupled to both

a) said TDM data converter/encapsulator, and

b) said clock frequency multiplier; and

wherein said at least one reception module comprises

v) a second switch for receiving converted/encapsulated TDM data from said Ethernet network over at least one Ethernet communications medium;

vi) a TDM decapsulator coupled to said second switch;

vii) a clock recovery PLL for receiving a frequency, said PLL being adapted to adjust a phase of said frequency to provide a phase-adjusted frequency; and

viii) a clock frequency divider coupled to said PLL for dividing said phase-adjusted frequency to recover a TDM clock signal associated with said TDM data;

wherein said TDM decapsulator is a) coupled to said clock frequency divider, and b) adapted and arranged to serialize said received converted/encapsulated TDM data by means of said recovered TDM clock signal.

16. The system of claim 15, wherein said at least one transmission module and said at least one reception module are located distant from one another and are adapted and arranged to function as a first operational pair for communicating data in a first direction.

17. The system of claim 16, further comprising a second reception module and a second transmission module,

wherein said second transmission module and said second reception module are operationally adapted and arranged to function as a second operational pair,

and wherein said first and second operational pairs are adapted and arranged to function as a bi-directional communications system for communicating in said first direction and in a second direction, said second direction being opposite said first direction.

18. The system of claim 17, wherein said at least one transmission module and said second reception module are co-located with one another to comprise a first transceiver module.

19. The system of claim 17, wherein said at least one reception module and said second transmission module are co-located with one another to form a second transceiver module.

20. The system of claim 17, wherein at least one reception module and at least one transmission module are co-located to form a transceiver module.

21. The system of claim 17, comprising a plurality of transceiver modules operationally coupled, adapted and arranged to form a network.

22. The system of claim 15, wherein said transmission module comprises at least two ports, and wherein said master clock governs and synchronizes the timing of data transmissions from each of said ports.

23. The system of claim 15, wherein said reception module comprises at least two ports, and wherein said master clock governs and synchronizes timing of data transmissions from said ports.

24. The system of claim 15, wherein said clock frequency multiplier has an input frequency, an output frequency, and a frequency multiplication ratio which is the ratio of said input and output frequencies, and wherein said multiplier is adapted and arranged such that said output frequency is a multiple of said input frequency.

25. The system of claim 24, wherein one or more of said input frequency, said output frequency, and said frequency multiplication ratio are digitally programmable.

26. The system of claim 15, wherein said converted/encapsulated TDM data is received as Ethernet packets and said Ethernet packets are converted into at least one TDM protocol data stream by said TDM decapsulator.

27. The system according to claim 16, wherein said clock recovery PLL extracts a high frequency clock signal from said received Ethernet data and said extracted frequency clock equals the data bit rate of said received TDM data.

28. The apparatus according to claim 15, wherein said clock frequency divider has an input frequency, an output frequency, and a frequency division ratio which is the ratio of said input and output frequencies, and wherein said clock frequency divider is adapted and arranged such that said output frequency is a fraction of said input frequency.

29. A method for transmitting Time Division Multiplexed ("TDM") data over an Ethernet network comprising the acts of

i) receiving said TDM data and a synchronous clock associated with said TDM data from a source by means of a TDM data converter/encapsulator;

ii) generating a master clock signal related to said synchronous clock signal,

iii) packetizing said TDM data,

iv) forwarding said packetized data and said master clock signal to a switch; and

v) switching said packetized TDM data onto at least one Ethernet communications media of said Ethernet network.

30. The method of claim 29, wherein said master clock signal is generated by said clock frequency multiplier, and said master clock is related to said synchronous clock signal associated with said TDM data, and wherein said switching is effected by a switch which is coupled to both said TDM data converter/encapsulator, and to said clock frequency multiplier.

31. The method of claim 29, wherein said acts iii and iv are performed concurrently.

32. The method of claim 29, wherein said switch comprises at least two ports, and wherein said master clock signal governs and synchronizes the timing of data transmissions from said switch.

33. The method of claim 29, wherein said clock frequency multiplier has an input frequency, an output frequency, and a frequency multiplication ratio which is equal to the ratio of said input and output frequencies, and wherein said multiplier is adapted and arranged such that said output frequency is a multiple of said input frequency.

34. The method of claim 29, wherein said output frequency equals said master clock frequency

35. The method of claim 34, wherein one or more of said input frequency, said output frequency, and said frequency multiplication ratio are digitally programmable.

36. A method for receiving converted/encapsulated Time Division Multiplexed ("TDM") data over an Ethernet network comprising the acts of:

i) receiving said converted/encapsulated TDM data from said Ethernet network by means of a switch;

ii) decapsulating said TDM data by means of a TDM decapsulator coupled to said switch;

iii) receiving a clock frequency signal by means of a clock recovery PLL;

iv) adjusting said clock frequency signal by means of said clock recovery PLL to provide a phase-adjusted clock frequency, said PLL being adapted to adjust a phase of said clock frequency signal; and

v) dividing said phase-adjusted clock frequency by means of a clock frequency divider coupled to said PLL to recover a TDM clock signal associated with said TDM data.

37. The method of claim 36, wherein said TDM decapsulator is

a) coupled to said clock frequency divider, and

b) adapted and arranged to serialize said received converted/ encapsulated TDM data by means of said recovered TDM clock signal.

38. The method of claim 36, wherein said converted/encapsulated TDM data is received as Ethernet packets and said Ethernet packets are converted into at least one TDM protocol data stream.

39. The method of claim 36, wherein said acts iii and iv are performed concurrently.

40. The method of claim 36, wherein said switch comprises at least two ports, and wherein said master clock signal governs and synchronizes the timing of data transmissions from said switch.

41. The method of claim 36, wherein said clock frequency divider has an input frequency, an output frequency, and a frequency division ratio which is equal to the ratio of said input and output frequencies, and wherein said divider is adapted and arranged such that said output frequency is a fraction of said input frequency.

42. The method of claim 36, wherein said output frequency equals said master clock frequency.

43. The method of claim 36, wherein one or more of said input frequency, said output frequency, and said frequency division ratio are programmable.

44. A method for communicating Time Division Multiplexed data over an Ethernet network, said method comprising the act of

I) providing at least two transceiver modules, and

II) operationally coupling, adapting or arranging said at least two transceiver modules to effect communication therebetween.

45. The method of claim 44, wherein each of said transceiver modules comprises A) at least one transmission module and B) at least one reception module, wherein each said at least one transmission module comprises

i) a TDM data converter/encapsulator for receiving TDM data from a source;

ii) a synchronous clock signal associated with said TDM data;

iii) a clock frequency multiplier coupled to said TDM data converter/encapsulator; and

iv) a first switch for receiving converted/encapsulated TDM data and for receiving a master clock signal;

wherein said master clock signal is generated by said clock frequency multiplier, said master clock signal being related to said synchronous clock signal associated with said TDM data; and

wherein said first switch is coupled to both

a) said TDM data converter/encapsulator, and

b) said clock frequency multiplier; and

wherein each said at least one reception module comprises

v) a second switch for receiving converted/encapsulated TDM data from said Ethernet network over at least one Ethernet communications medium;

vi) a TDM decapsulator coupled to said second switch;

vii) a clock recovery PLL for receiving a frequency, said PLL being adapted to adjust a phase of said frequency to provide a phase-adjusted frequency; and

viii) a clock frequency divider coupled to said PLL for dividing said phase-adjusted frequency to recover a TDM clock signal associated with said TDM data;

wherein said TDM decapsulator is a) coupled to said clock frequency divider, and b) adapted and arranged to serialize said received converted/encapsulated TDM data by means of said recovered TDM clock signal.

46. The method of claim 44, comprising the further acts of

III) providing more than two of said transceiver modules, and

IV) operationally coupling, adapting or arranging said more than two transceiver modules to effect communication or among any two or more of said modules.

47. A network comprising:

A) a first Ethernet network and a second Ethernet network, wherein each of said Ethernet networks is adapted for bi-directional communications between a transmission module and a reception module of each of said Ethernet networks,

B) at least one wide area network (WAN) adapted for long-distance bi-directional communications, said wide area network being interposed between said first and said second Ethernet networks, and

C) a plurality of operational pairs of switches adapted for performing clock recovery functions and data transfer functions between pairs of Ethernet networks,

wherein said first Ethernet network and said second Ethernet network are adapted to communicate with one another through said wide area network.

48. The network of claim 47, wherein each of said first and second Ethernet networks comprises at least one transmission module, and at least one reception module.

49. The network of claim 47, wherein each of said Ethernet transmission modules comprises

i) a TDM data converter/encapsulator for receiving TDM data from a source;

ii) a synchronous clock signal associated with said TDM data;

iii) a clock frequency multiplier coupled to said TDM data converter/encapsulator; and

iv) a transmission module switch for receiving converted/encapsulated TDM data and for receiving a master clock signal;

wherein said master clock signal is generated by said clock frequency multiplier, said master clock signal being related to said synchronous clock signal associated with said TDM data; and

wherein said transmission module switch is coupled to both

a) said TDM data converter/encapsulator, and

b) said clock frequency multiplier; and

wherein each of said Ethernet reception modules comprises:

v) a reception module switch for receiving converted/encapsulated TDM data from said Ethernet network over at least one Ethernet communications medium;

vi) a TDM decapsulator coupled to said second switch;

vii) a clock recovery PLL for receiving a frequency, said PLL being adapted to adjust a phase of said frequency to provide a phase-adjusted frequency; and

viii) a clock frequency divider coupled to said PLL for dividing said phase-adjusted frequency to recover a TDM clock signal associated with said TDM data;

wherein said TDM decapsulator is a) coupled to said clock frequency divider, and b) adapted and arranged to serialize said received converted/encapsulated TDM data by means of said recovered TDM clock signal.

50. The network of claim 47, wherein each of said operational pairs of switches is adapted and configured between one of said Ethernet networks and said WAN to function as a transceiver switch pair.

51. The network of claim 48, wherein said at least one Ethernet reception module and said at least one Ethernet transmission module are adapted or configured to form a single operational transceiver module.

52. The network of claim 47, wherein a first pair of said plurality of operational pairs of switches is configured as a transmission switch pair such that

i) a first switch of said transmission switch pair accepts encapsulated Ethernet data from one of said at least two Ethernet networks for transmission to a second switch of said transmission switch pair, and

ii) said second switch of said transmission switch pair transmits said encapsulated Ethernet data and interfaces with said WAN to transmit said encapsulated Ethernet data over said WAN to a second pair of said plurality of pairs of switches,

and wherein said second pair of said plurality of switches is configured as a reception switch pair such that,

iii) a first switch of said reception switch pair receives said encapsulated Ethernet data via said WAN, and

iv) a second switch of said reception switch pair receives said encapsulated Ethernet data from said first switch of said reception switch pair for forwarding and distribution over a second of said at least two Ethernet networks.

53. The network of claim 52, further comprising a plurality of said Ethernet networks and a plurality of said operational switch pairs.

54. The network of claim 47, further comprising at least one TDM network, wherein said TDM network is adapted and configured to communicate with at least one of said Ethernet networks.

55. The network of claim 52, wherein said first pair of said plurality of operational pairs of switches is configured both as a transmission switch pair and a reception switch pair to form a transceiver switch pair for bidirectional communications.

56. The network of claim 55, wherein said operational pairs of switches are implemented to form an adapted network switch.

57. A method for communicating TDM data over long distances comprising the acts of:

A) providing at least a first Ethernet network and a second Ethernet network, wherein each of said Ethernet networks is adapted for bi-directional communications between a transmission module and a reception module of each of said Ethernet networks,

B) providing at least one wide area network (WAN) adapted for long-distance bi-directional communications, said wide area network being interposed between said first and said second Ethernet networks, and

C) providing a plurality of operational pairs of switches adapted for performing clock recovery functions and data transfer functions between pairs of Ethernet networks,

wherein said first Ethernet network and said second Ethernet network are adapted to communicate with one another through said wide area network.

58. The method of claim 57, wherein a first pair of said plurality of operational pairs of switches is configured as a transmission switch pair such that

i) a first switch of said transmission switch pair accepts encapsulated Ethernet data from one of said at least two Ethernet networks for transmission to a second switch of said transmission switch pair, and

ii) said second switch of said transmission switch pair transmits said encapsulated Ethernet data and interfaces with said WAN to transmit said encapsulated Ethernet data over said WAN to a second pair of said plurality of pairs of switches,

and wherein said second pair of said plurality of switches is configured as a reception switch pair such that,

iii) a first switch of said reception switch pair receives said encapsulated Ethernet data via said WAN, and

iv) a second switch of said reception switch pair receives said encapsulated Ethernet data from said first switch of said reception switch pair for forwarding and distribution over a second of said at least two Ethernet networks.

59. The method of claim 57, wherein said method is effected over a plurality of said Ethernet networks and a plurality of said operational switch pairs.

60. The method of claim 59, wherein said method is effected over at least one TDM network, wherein said TDM network is adapted and configured to communicate with at least one of said Ethernet networks.

61. A method for communicating TDM data over long distances, comprising the acts of:

A. providing TDM data and a synchronized clock signal from a first TDM network to a first Ethernet network;

B. encapsulating said TDM data;

C. generating a master clock signal related to said synchronous clock signal by means of a frequency multiplier;

D. forwarding said encapsulated TDM data to a first operational pair pair;

E. forwarding said encapsulated TDM data to a second operational switch pair via a wide area network;

F. receiving said encapsulated TDM data at a destination in a second Ethernet network;

G. decapsulating said received encapsulated TDM data;

H. recovering and phase-adjusting a clock signal from said decapsulated TDM data using a phase-locked loop and a frequency divider;

I. serializing said decapsulated TDM data; and

J. forwarding said serialized TDM data and said recovered clock signal to a second TDM network.

62. An adapted network switch comprising:

i) a system clock generator;

ii) a control, processing and data switching matrix coupled to memory, said control, processing and data switching matrix further coupled to said system clock generator;

iii) a plurality of data communication ports coupled to said system clock generator, each of said ports further coupled to said control, processing and data switching matrix via bi-directional data signals; and

iv) a clock switching matrix coupled to said control, processing and data switching matrix via a control signal, said clock switching matrix configured such that a clock used in transmitting data from said adapted

network switch is the clock recovered from the data when said data was received at said data communications port.

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